

**Amendments to Claims**

This listing of claims will replace all prior versions and listings of claims in the application:

**Claim 1.** (currently amended) An isolated nucleic acid ~~sequence~~ encoding a polypeptide with isoflavone synthase activity having the amino acid sequence set forth in SEQ ID NO:66, wherein the nucleic acid fragment does not have the nucleotide sequence set forth in SEQ ID NO:9, and wherein

Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Ser or Leu  
Xaa<sub>23</sub> is Ser or Thr  
Xaa<sub>25</sub> is Ile or Lys  
Xaa<sub>39</sub> is Lys or Arg  
Xaa<sub>48</sub> is Pro or Leu  
Xaa<sub>60</sub> is Pro or Leu  
Xaa<sub>73</sub> is Leu or His  
Xaa<sub>74</sub> is Ser or Tyr  
Xaa<sub>95</sub> is Ala or Thr  
Xaa<sub>96</sub> is Asn or His  
Xaa<sub>102</sub> is Asn or Ser  
Xaa<sub>110</sub> is Ile, Val, or Thr  
Xaa<sub>112</sub> is Arg or His  
Xaa<sub>117</sub> is Asn or Ser  
Xaa<sub>118</sub> is Ser or Leu  
Xaa<sub>121</sub> is Met or Arg  
Xaa<sub>122</sub> is Ala or Val  
Xaa<sub>124</sub> is Phe or Ile  
Xaa<sub>129</sub> is Lys or Arg  
Xaa<sub>147</sub> is Lys or Glu  
Xaa<sub>159</sub> is Leu or Phe  
Xaa<sub>162</sub> is Ala or Val  
Xaa<sub>166</sub> is Ser or Gly  
Xaa<sub>170</sub> is Gln or Arg  
Xaa<sub>175</sub> is Val or Leu  
Xaa<sub>183</sub> is Ala or Thr  
Xaa<sub>187</sub> is Thr or Ile  
Xaa<sub>191</sub> is Met or Val  
Xaa<sub>209</sub> is Phe or Tyr  
Xaa<sub>219</sub> is Arg or Trp

Xaa<sub>223</sub> is Tyr or His  
Xaa<sub>253</sub> is Gly or Glu  
Xaa<sub>259</sub> is Lys or Glu  
Xaa<sub>263</sub> is Val or Asp  
Xaa<sub>264</sub> is Val, Asp, or Ile  
Xaa<sub>268</sub> is Ala or Val  
Xaa<sub>272</sub> is Phe or Leu  
Xaa<sub>285</sub> is Thr or Met  
Xaa<sub>293</sub>~~292~~ is Glu or Asp  
Xaa<sub>293</sub> is Gln or His  
Xaa<sub>294</sub> is Thr, or Ile  
Xaa<sub>301</sub> is Phe or Leu  
Xaa<sub>306</sub> is Thr or Ile  
Xaa<sub>311</sub> is Val or Glu  
Xaa<sub>312</sub> is Val or Ala  
Xaa<sub>325</sub> is Arg or Lys  
Xaa<sub>328</sub> is Gln or Glu  
Xaa<sub>334</sub> is Val or Ala  
Xaa<sub>342</sub> is Arg or Ile  
Xaa<sub>377</sub> is Thr or Ile  
Xaa<sub>381</sub> is Glu or Gly  
Xaa<sub>385</sub> is Tyr, His, or Cys  
Xaa<sub>387</sub> is Ile or Thr  
Xaa<sub>393</sub> is Val or Ile  
Xaa<sub>394</sub> is Leu or Pro  
Xaa<sub>402</sub> is Arg or Lys  
Xaa<sub>404</sub> is Ser or Pro  
Xaa<sub>413</sub> is Ser or Phe  
Xaa<sub>422</sub> is Glu or Gly  
Xaa<sub>428</sub> is Gly or Arg  
Xaa<sub>429</sub> is Pro or Leu  
Xaa<sub>435</sub> is Gln or Arg  
Xaa<sub>447</sub> is Arg or Gly  
Xaa<sub>453</sub> is Asn, Ser, or Ile  
Xaa<sub>459</sub> is Met or Thr, and  
Xaa<sub>485</sub> is Asp or Gly.

**Claim 2.** (canceled) An isolated polypeptide sequence of SEQ ID NO: 66 wherein  
Xaa<sub>10</sub> is Phe or Leu

Xaa<sub>16</sub> is Ser or Leu  
Xaa<sub>23</sub> is Ser or Thr  
Xaa<sub>25</sub> is Ile or Lys  
Xaa<sub>39</sub> is Lys or Arg  
Xaa<sub>48</sub> is Pro or Leu  
Xaa<sub>60</sub> is Pro or Leu  
Xaa<sub>73</sub> is Leu or His  
Xaa<sub>74</sub> is Ser or Tyr  
Xaa<sub>95</sub> is Ala or Thr  
Xaa<sub>96</sub> is Asn or His  
Xaa<sub>102</sub> is Asn or Ser  
Xaa<sub>110</sub> is Ile, Val, or Thr  
Xaa<sub>112</sub> is Arg or His  
Xaa<sub>117</sub> is Asn or Ser  
Xaa<sub>118</sub> is Ser or leu  
Xaa<sub>121</sub> is Met or Arg  
Xaa<sub>122</sub> is Ala or Val  
Xaa<sub>124</sub> is Phe or Ile  
Xaa<sub>129</sub> is Lys or Arg  
Xaa<sub>147</sub> is Lys or Glu  
Xaa<sub>159</sub> is Leu or Phe  
Xaa<sub>162</sub> is Ala or Val  
Xaa<sub>166</sub> is Ser or Gly  
Xaa<sub>170</sub> is Gln or Arg  
Xaa<sub>175</sub> is Val or Leu  
Xaa<sub>183</sub> is Ala or Thr  
Xaa<sub>187</sub> is Thr or Ile  
Xaa<sub>191</sub> is Met or Val  
Xaa<sub>209</sub> is Phe or Tyr  
Xaa<sub>219</sub> is Arg or Trp  
Xaa<sub>223</sub> is Tyr or His  
Xaa<sub>253</sub> is Gly or Glu  
Xaa<sub>259</sub> is Lys or Glu  
Xaa<sub>263</sub> is Val or Asp  
Xaa<sub>264</sub> is Val, Asp, or Ile  
Xaa<sub>268</sub> is Ala or Val  
Xaa<sub>272</sub> is Phe or Leu  
Xaa<sub>285</sub> is Thr or Met

Xaa<sub>293</sub> is Glu or Asp  
Xaa<sub>294</sub> is Thr, or Ile  
Xaa<sub>301</sub> is Phe or Leu  
Xaa<sub>306</sub> is Thr or Ile  
Xaa<sub>311</sub> is Val or Glu  
Xaa<sub>312</sub> is Val or Ala  
Xaa<sub>325</sub> is Arg or Lys  
Xaa<sub>328</sub> is Gln or Glu  
Xaa<sub>334</sub> is Val or Ala  
Xaa<sub>342</sub> is Arg or Ile  
Xaa<sub>377</sub> is Thr or Ile  
Xaa<sub>381</sub> is Glu or Gly  
Xaa<sub>385</sub> is Tyr, His, or Cys  
Xaa<sub>387</sub> is Ile or Thr  
Xaa<sub>393</sub> is Val or Ile  
Xaa<sub>394</sub> is Leu or Pro  
Xaa<sub>402</sub> is Arg or Lys  
Xaa<sub>404</sub> is Ser or Pro  
Xaa<sub>413</sub> is Ser or Phe  
Xaa<sub>422</sub> is Glu or Gly  
Xaa<sub>428</sub> is Gly or Arg  
Xaa<sub>429</sub> is Pro or Leu  
Xaa<sub>435</sub> is Gln or Arg  
Xaa<sub>447</sub> is Arg or Gly  
Xaa<sub>453</sub> is Asn, Ser, or Ile  
Xaa<sub>459</sub> is Met or Thr, and  
Xaa<sub>485</sub> is Asp or Gly.

**Claim 3.** (currently amended) An isolated nucleic acid ~~sequence~~ encoding a polypeptide with isoflavone synthase activity capable of converting 2S-flavanone into an isoflavonoid.

**Claim 4.** (currently amended) An isolated nucleic acid ~~sequence~~ encoding a polypeptide with isoflavone synthase activity capable of converting 2S-flavanone into an isoflavonoid wherein the nucleic acid ~~sequence~~ is not the nucleic acid sequence set forth in SEQ ID NO:9.

**Claims 5-10** (canceled).

**Claim 11.** (currently amended) A chimeric polynucleotide ~~sequence~~ comprising the nucleic acid ~~sequence~~ of Claim 1 operably linked to at least one suitable regulatory ~~sequences~~ sequence.

**Claim 12.** (currently amended) A transformed host cell comprising the chimeric polynucleotide sequence of Claim 11.

**Claim 13.** (currently amended) The transformed host cell of Claim 12 further comprising a second chimeric polynucleotide sequence comprising a nucleic acid sequence encoding a polypeptide that regulates expression of at least one enzyme of the phenylpropanoid pathway.

**Claim 14.** (currently amended) The transformed host cell of Claim 13 wherein the second chimeric polynucleotide sequence comprises a chimera containing a polynucleotide encoding the maize R region, wherein the R region is between polynucleotide the region encoding the maize C1 DNA binding domain and the maize C1 activation domain.

**Claim 15.** (original) The transformed host cell of Claim 12 wherein the host cell is a eukaryotic cell.

**Claim 16.** (original) The eukaryotic cell of Claim 13 wherein the cell is a yeast cell.

**Claim 17.** (original) The eukaryotic cell of Claim 15 wherein the cell is a plant cell.

**Claim 18.** (original) The plant cell of Claim 17 wherein the cell is a soybean cell.

**Claim 19.** (original) The plant cell of Claim 17 wherein the cell is a corn cell.

**Claims 20-25.** (canceled).

**Claim 26.** (currently amended) A method of altering the level of expression of isoflavone synthase in a host cell comprising:

- (a) transforming a host cell with the chimeric polynucleotide ~~sequence~~ of Claim 11;
- ~~(b)~~ optionally or transforming the host cell with the chimeric polynucleotide of Claim 11 and with a second chimeric polynucleotide sequence comprising a nucleic acid sequence encoding a polypeptide that regulates expression of at least one enzyme of the phenylpropanoid pathway; and
- ~~(b)~~ growing the transformed host cell produced in step (a) ~~or step (b)~~ under conditions that are suitable for expression of the chimeric polynucleotide sequence

wherein expression of the chimeric ~~sequences result~~ polynucleotide results in production of altered levels of isoflavone synthase in the transformed host cell.

**Claims 27 and 28** (canceled).

**Claim 29.** (currently amended) The method of Claim 26 ~~or Claim 27~~ wherein the host cell is a eukaryotic cell.

**Claim 30.** (currently amended) The method of Claim 26 ~~or Claim 27~~ wherein the eukaryotic cell is a yeast cell.

**Claim 31.** (currently amended) The method of Claim 26 ~~or Claim 27~~ wherein the eukaryotic cell is a plant cell.

**Claim 32.** (original) The method of Claim 31 wherein the plant cell is a soybean cell.

**Claim 33.** (original) The method of Claim 31 wherein the plant cell is a corn cell.

**Claims 34-50** (canceled).

**Claim 51.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Phe  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Ser  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Ser  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Asn  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Ser  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Val  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is Tyr

Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Ala  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Glu  
Xaa<sub>293</sub> is Gln  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Arg  
Xaa<sub>328</sub> is Gln  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Val  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Gly  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Asp.

**Claim 52.** (new) The isolated nucleic acid fragment of Claim 1 where  
Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Leu

Xaa<sub>23</sub> is Ser  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Ser  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Thr  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Asn  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Arg  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Ser  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Val  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is Tyr  
Xaa<sub>253</sub> is Gly  
Xaa<sub>259</sub> is Glu  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Ala  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Glu



Xaa<sub>293</sub> is Gln  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Leu  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Arg  
Xaa<sub>328</sub> is Gln  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Val  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Gly  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Asp.

**Claim 53.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr

Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Leu  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Tyr  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Thr  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Ile  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu

Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Gly  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Gly.

**Claim 54.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Pro  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val

Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Ser  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Val  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is Tyr  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Ala  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Glu  
Xaa<sub>293</sub> is Gln  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Arg  
Xaa<sub>328</sub> is Gln  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Ile  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is His  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Val  
Xaa<sub>394</sub> is Leu

Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Gly  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Asp.

**Claim 55.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu

Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Val  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Cys  
Xaa<sub>387</sub> is Thr  
Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Leu  
Xaa<sub>435</sub> is Arg  
Xaa<sub>447</sub> is Arg

Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Gly.

**Claim 56.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys

Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu  
Xaa<sub>334</sub> is Ala  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Gly.

**Claim 57.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys



Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Ala  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile

Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Gly.

**Claim 58.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn

Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Thr  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg

Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Gly.

**Claim 59.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys

Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Glu  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro

Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Gly.

**Claim 60.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Ile  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile

Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Asp  
Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Thr  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met

Xaa<sub>485</sub> is Gly.

**Claim 61.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val



Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Thr  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Va  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Gly.

**Claim 62.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Phe  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Ser  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu

Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Ser  
Xaa<sub>95</sub> is Ala  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Ser  
Xaa<sub>110</sub> is Val  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Asn  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Glu  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Ser  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Val  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is Tyr  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Ala  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Glu  
Xaa<sub>293</sub> is Gln  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr

Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Arg  
Xaa<sub>328</sub> is Gln  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Val  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Lys  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Gly  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Asp.

**Claim 63.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Ser  
Xaa<sub>23</sub> is Ser  
Xaa<sub>25</sub> is Ile  
Xaa<sub>39</sub> is Arg  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Pro  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Ser  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is His

Xaa<sub>117</sub> is Asn  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Ser  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Val  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is Tyr  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Ala  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Glu  
Xaa<sub>293</sub> is Gln  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Val  
Xaa<sub>325</sub> is Arg  
Xaa<sub>328</sub> is Gln  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu

Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Val  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Ser  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Gly  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Ser  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Asp.

**Claim 64.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe

Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Ser  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Val  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is Tyr  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Ala  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Glu  
Xaa<sub>293</sub> is Gln  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Val  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Gln  
Xaa<sub>334</sub> is Ala  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Gly  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Val  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly

Xaa<sub>428</sub> is Gly  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Asp.

**Claim 65.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe

Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Asp  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Ile  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Leu  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Gly.

**Claim 66.** (new) The isolated nucleic acid fragment of claim 1 where



Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Arg  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is MetI  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Leu

Xaa<sub>285</sub> is Met  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Glu  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Gly.

**Claim 67.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu

Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser  
Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Ala  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Phe  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Thr  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Arg  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Val  
Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Thr  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala

Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile  
Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Ser  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Gly.

**Claim 68.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu  
Xaa<sub>74</sub> is Tyr  
Xaa<sub>95</sub> is Thr  
Xaa<sub>96</sub> is His  
Xaa<sub>102</sub> is Asn  
Xaa<sub>110</sub> is Ile  
Xaa<sub>112</sub> is Arg  
Xaa<sub>117</sub> is Ser  
Xaa<sub>118</sub> is Ser

Xaa<sub>121</sub> is Met  
Xaa<sub>122</sub> is Val  
Xaa<sub>124</sub> is Phe  
Xaa<sub>129</sub> is Lys  
Xaa<sub>147</sub> is Lys  
Xaa<sub>159</sub> is Leu  
Xaa<sub>162</sub> is Val  
Xaa<sub>166</sub> is Gly  
Xaa<sub>170</sub> is Gln  
Xaa<sub>175</sub> is Leu  
Xaa<sub>183</sub> is Thr  
Xaa<sub>187</sub> is Ile  
Xaa<sub>191</sub> is Met  
Xaa<sub>209</sub> is Phe  
Xaa<sub>219</sub> is Trp  
Xaa<sub>223</sub> is His  
Xaa<sub>253</sub> is Glu  
Xaa<sub>259</sub> is Lys  
Xaa<sub>263</sub> is Val  
Xaa<sub>264</sub> is Ile  
Xaa<sub>268</sub> is Val  
Xaa<sub>272</sub> is Phe  
Xaa<sub>285</sub> is Thr  
Xaa<sub>292</sub> is Asp  
Xaa<sub>293</sub> is His  
Xaa<sub>294</sub> is Ile  
Xaa<sub>301</sub> is Phe  
Xaa<sub>306</sub> is Thr  
Xaa<sub>311</sub> is Val  
Xaa<sub>312</sub> is Ala  
Xaa<sub>325</sub> is Lys  
Xaa<sub>328</sub> is Glu  
Xaa<sub>334</sub> is Val  
Xaa<sub>342</sub> is Arg  
Xaa<sub>377</sub> is Thr  
Xaa<sub>381</sub> is Glu  
Xaa<sub>385</sub> is Tyr  
Xaa<sub>387</sub> is Ile

Xaa<sub>393</sub> is Ile  
Xaa<sub>394</sub> is Leu  
Xaa<sub>402</sub> is Arg  
Xaa<sub>404</sub> is Pro  
Xaa<sub>413</sub> is Phe  
Xaa<sub>422</sub> is Gly  
Xaa<sub>428</sub> is Arg  
Xaa<sub>429</sub> is Pro  
Xaa<sub>435</sub> is Gln  
Xaa<sub>447</sub> is Arg  
Xaa<sub>453</sub> is Asn  
Xaa<sub>459</sub> is Met, and  
Xaa<sub>485</sub> is Gly.

**Claim 69.** (new) The isolated nucleic acid fragment of Claim 1 where

Xaa<sub>10</sub> is Phe or Leu  
Xaa<sub>16</sub> is Leu  
Xaa<sub>23</sub> is Thr  
Xaa<sub>25</sub> is Lys  
Xaa<sub>39</sub> is Lys  
Xaa<sub>48</sub> is Leu  
Xaa<sub>60</sub> is Leu  
Xaa<sub>73</sub> is Leu or His  
Xaa<sub>74</sub> is Ser or Tyr  
Xaa<sub>95</sub> is Ala or Thr  
Xaa<sub>96</sub> is Asn or His  
Xaa<sub>102</sub> is Asn or Ser  
Xaa<sub>110</sub> is Ile, Val, or Thr  
Xaa<sub>112</sub> is Arg or His  
Xaa<sub>117</sub> is Asn or Ser  
Xaa<sub>118</sub> is Ser or Leu  
Xaa<sub>121</sub> is Met or Arg  
Xaa<sub>122</sub> is Ala or Val  
Xaa<sub>124</sub> is Phe or Ile  
Xaa<sub>129</sub> is Lys or Arg  
Xaa<sub>147</sub> is Lys or Glu  
Xaa<sub>159</sub> is Leu or Phe  
Xaa<sub>162</sub> is Ala or Val  
Xaa<sub>166</sub> is Ser or Gly

Xaa<sub>170</sub> is Gln or Arg  
Xaa<sub>175</sub> is Val or Leu  
Xaa<sub>183</sub> is Ala or Thr  
Xaa<sub>187</sub> is Thr or Ile  
Xaa<sub>191</sub> is Met or Val  
Xaa<sub>209</sub> is Phe or Tyr  
Xaa<sub>219</sub> is Arg or Trp  
Xaa<sub>223</sub> is Tyr or His  
Xaa<sub>253</sub> is Gly or Glu  
Xaa<sub>259</sub> is Lys or Glu  
Xaa<sub>263</sub> is Val or Asp  
Xaa<sub>264</sub> is Val, Asp, or Ile  
Xaa<sub>268</sub> is Ala or Val  
Xaa<sub>272</sub> is Phe or Leu  
Xaa<sub>285</sub> is Thr or Met  
Xaa<sub>292</sub> is Glu or Asp  
Xaa<sub>293</sub> is Gln or His  
Xaa<sub>294</sub> is Thr, or Ile  
Xaa<sub>301</sub> is Phe or Leu  
Xaa<sub>306</sub> is Thr or Ile  
Xaa<sub>311</sub> is Val or Glu  
Xaa<sub>312</sub> is Val or Ala  
Xaa<sub>325</sub> is Arg or Lys  
Xaa<sub>328</sub> is Gln or Glu  
Xaa<sub>334</sub> is Val or Ala  
Xaa<sub>342</sub> is Arg or Ile  
Xaa<sub>377</sub> is Thr or Ile  
Xaa<sub>381</sub> is Glu or Gly  
Xaa<sub>385</sub> is Tyr, His, or Cys  
Xaa<sub>387</sub> is Ile or Thr  
Xaa<sub>393</sub> is Val or Ile  
Xaa<sub>394</sub> is Leu or Pro  
Xaa<sub>402</sub> is Arg or Lys  
Xaa<sub>404</sub> is Ser or Pro  
Xaa<sub>413</sub> is Ser or Phe  
Xaa<sub>422</sub> is Glu or Gly  
Xaa<sub>428</sub> is Gly or Arg  
Xaa<sub>429</sub> is Pro or Leu

Xaa<sub>435</sub> is Gln or Arg  
Xaa<sub>447</sub> is Arg or Gly  
Xaa<sub>453</sub> is Asn, Ser, or Ile  
Xaa<sub>459</sub> is Met or Thr, and  
Xaa<sub>485</sub> is Asp or Gly.